

# **Chemical Accident Prevention & Preparedness in ASEAN Region:**

## ***Overview Report***

June 2014

## Contents

1	Introduction .....	3
	The objectives of the report are: .....	4
2	Asia’s chemical industry presence .....	5
3	Existing regional policies and/or programmes relevant to CAPP .....	5
3.1	Cambodia.....	6
3.2	Indonesia .....	7
3.3	Laos .....	8
3.4	Malaysia.....	9
3.5	Myanmar .....	10
3.6	Philippines .....	11
3.7	Thailand .....	13
3.8	Vietnam .....	15
3.9	Analysis of the current status of legislation in the region.....	16
4	Centres of Excellence for CAPP .....	17
4.1	Regional organisations and/or activities .....	17
4.2	National Centres of Excellence .....	19
5	Challenges and limitations faced regarding safety of chemical industries in ASEAN region .....	21
6	Disaster Risk Reduction and potential for inclusiveness of CAPP under regional activities .....	22
6.1	Regional Cooperation on Disaster Risk Reduction.....	22
6.2	National Policies on Disaster Risk Management.....	23
6.3	Disaster Risk Reduction and Management Act, 2010 .....	23
6.4	Inclusiveness of CAPP under regional disaster risk reduction activities .....	24
7	The Benefits of Regional Cooperation on CAPP in Asia .....	25
8	Conclusion .....	26

## 1 Introduction

In the past 25 years, global chemical industry's growth has been mainly driven by Asia, which now owns almost half of the global chemical sales, as indicated in Figures 1.<sup>1,3</sup> Table 1 from UNEP's *Global Chemicals Outlook-Synthesis Report* also specifies that Asia Pacific region has the highest predicted growth for 2012-2020 in which China and India are indicated as the highest producers<sup>2</sup>. Most of the global players of the chemical industry are increasingly shifting their value chains (e.g. production and operations) towards Asia due to its economic growth, readily available resources, cheap labour, low capital expenditure, and emerging regional market opportunities<sup>1,2</sup>.

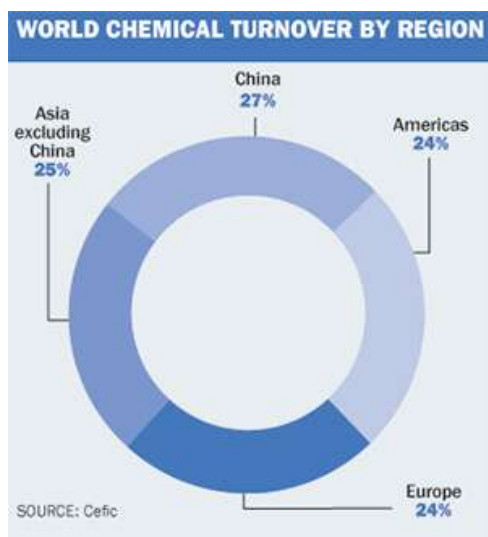


Figure 1: Gross income from regional chemicals market <sup>3</sup>

Chemical safety has to be at the top of the chemical industry's agenda because most chemical substances are potentially hazardous at some stage during their use, storage, manufacture or transport. These chemicals in its different states (solids, liquids, gases) can be flammable, corrosive, explosive and/or toxic. Most manufacturing processes are usually operated at high temperatures or pressures and reactions that can be dangerous if not cautiously controlled. As a result, the industry has to operate within safety limits regulated by national and international legislation. Therefore, effective governance on chemical accident prevention and preparedness is important because increased growth of a chemical industry is much more vulnerable to occurrence of chemical accidents.

Table 1. Chemical Production: Predicted Growth, 2012-2020		
	Percent change, 2012-2020	
<b>North America</b>	<b>25%</b>	
United States		25%
Canada		27%
Mexico		28%
<b>Latin America</b>	<b>33%</b>	
Brazil		35%
Other		31%
<b>Western Europe</b>	<b>24%</b>	
<b>Emerging Europe</b>	<b>35%</b>	
Russia		34%
Other		36%
<b>Africa &amp; Middle East</b>	<b>40%</b>	
<b>Asia-Pacific</b>	<b>46%</b>	
Japan		22%
China		66%
India		59%
Australia		23%
Korea		35%
Singapore		35%
Other		44%

Source: UNEP's Global Chemicals Outlook towards sound management of chemicals – Synthesis report for decision makers, 2012

### Scope and objectives

This report aims to focus on key legislation regarding chemical accident prevention and preparedness (CAPP) and/or activities in the following ASEAN developing countries: Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Thailand, and Vietnam. A brief study of the region's challenges and limitations faced and how CAPP activities can fall under national or regional disaster risk reduction (DRR) programme of work is justified. The report mainly highlights on regional cooperation for a collaborative progress on CAPP as a way forward towards tackling the challenges and limitations faced by respective ASEAN Countries in the region.

The objectives of the report are:

- To highlight the presence of an ever growing chemical industry in Asia;
- to briefly identify the key policies and or programmes relevant to CAPP or industrial disaster risk reduction in the following developing ASEAN countries: Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Thailand, and Vietnam;
- to recognise key regional and/or national centres of excellence with regard to CAPP e.g. universities, regional and national organisations for chemical industries, country chapters for Responsible Care;

- to identify the challenges or limitations faced by these ASEAN countries with regard to development and implementation of national CAPP related programmes;
- to study how industrial risk reduction (or CAPP) can be included as a part of a national or regional disaster risk reduction/management programmes and policies; and
- to elaborate on the need for regional cooperation on CAPP within the ASEAN/Asian region and its benefits for the member countries.

The information for this report was mainly gathered through desktop research, undertaken by the Asian Disaster Preparedness Centre (ADPC).

## **2 Asia's chemical industry presence**

The importance of Asia to the chemical industry cannot be underestimated. Asia's large and growing middle class demands better crop yields, more consumer goods and electronics, and improved water treatment, all of which involve the design of advanced, cost-efficient chemical systems and products. The continuing industrialisation of Asia has also seen the rise of the manufacturing sector. This sector demands huge amounts of specialty chemicals to produce electronics, machinery and a vast assortment of other chemical related products both for use within Asia and for export.<sup>4</sup> Consequently, the chemical industry in Asia is expanding due to increase in demand resulting from increased GDP growth, urbanisation and growing middle classes. According to American Chemistry Council, overall chemical production from the Asia Pacific will increase by 6.5% in 2014.<sup>5</sup> Therefore, safe manufacture, use and disposal of various types of chemicals is a growing concern among local, regional and national governments, and will continue to be a key concern for the chemicals industry.

There is a varied presence of large or multi-national corporations and also local small medium enterprises (SMEs) operating in the region. Presently, India and China are not the only countries being considered by global companies as part of their Asian growth strategy. It has been predicted that other parts of ASEAN region such as Indonesia, Thailand, Vietnam and Philippines will be at the forefront in contributing towards the chemical industry growth in the region.<sup>5</sup> Since the chemical industry in these countries is still at an early stage, investment is likely to be focused on the commodity end of the sector and establishing the basic building blocks of the industry. However, with increased urbanization and continued middle-class growth, there are also likely to be opportunities in segments such as construction chemicals, consumer chemicals, and personal care. The challenge for these countries is to adopt the necessary fundamentals in place, both in terms of the chemical industry supply chain, as well as legal structures and business practices, such that these higher-value chemicals can be manufactured locally rather than being imported.<sup>5</sup>

## **3 Existing regional policies and/or programmes relevant to CAPP**

This chapter provides an overview of each of the following ASEAN countries' current legal framework and existing programmes for CAPP.

### 3.1 Cambodia

**Table 2.6: Key legal instruments related to CAPP in Cambodia** <sup>6</sup>

	Legal Instrument	Focal Agency	Further Description
Hazardous substances management	Law on Environmental Protection and Natural Resources Management; December 24, 1996	Ministry of Environment	Protect environmental quality; Prevent the environmental pollution through conducting environmental impact assessment for development projects; Manage chemicals and hazardous waste
	Sub-Degree No 72, on The Environment Impact Assessment Process August 11, 1999	Ministry of Environment	Determine measure to prevent the environmental pollution and public health impact caused by development projects.
	Sub-Degree no. 37, on Solid Waste Management April 27, 1999	Ministry of Environment	Control all activities related to solid waste and hazardous waste generation and disposal
Classification and labelling (GHS)	GHS not yet implemented		
Pesticides, Cosmetics or Drugs	Sub-Degree 69 on standard and Management of Agricultural Materials; October 28, 1998	Ministry of Agriculture, Forestry and Fisheries and Ministry of Environment	Control of any activity related to chemical fertilizers and pesticides such as: production, import, export, transport, distribution, sell, stock, disposal, and destroy.
	Law on Pharmaceuticals Management; May 09, 1996	Ministry of Health	Control of Pharmaceutical production, and exploitation aim to protect users' health and avoid the impact from obsolete and fraud of pharmaceutical products.
	Law on the Control of Drugs; January 2, 1997	Ministry of Interior and Ministry of Health	Prohibited the production, import, sell and use narcotic drugs.
Occupational Health and Safety	Labour Law, 1997 <sup>7</sup>	Ministry of Labour and Vocational Training	A separate chapter for health and safety of workers is stated. Mandate for labour inspections also indicated.
Transportation of Dangerous Goods	No specific legal instrument for chemicals safety or hazard communication in transport sector		

### 3.2 Indonesia

**Table 2.1: Key legal instruments related to CAPP in Indonesia**

Focus Area	Legal Instrument	Focal Agency	Further Description
New Chemical substances/inventory	The Application of Electronic Registration System of hazardous and toxic substances in the framework of Indonesia National Single Window in the Ministry of Environmental Affairs <sup>8</sup> (Decree of Environment Minister No: 2, 2010)	Ministry of Environment	The electronic system of hazardous substances shall aim at handling customs documents related to licensing and/or requirement for the import and/or export of hazardous substances in the framework Indonesian national single window data collection system.
Hazardous substances management	Law of the Republic of Indonesia on Environmental Protection and Management <sup>9</sup> , Law No: 32, 2009 (Revised)	Ministry of Environment	The Law makes provision for the management of hazardous and toxic materials as well as hazardous and toxic waste.
	Government Regulation of the Republic of Indonesia on Hazardous and Toxic Substance Management <sup>10</sup> , Regulation Number 74, 2001; Revision ongoing	Ministry of Environment	Classification, management, committee/commission for hazardous substances, work safety and health, accident and emergency management, supervision and reporting, community awareness improvement, information openness and community roles are being addressed.
	Government Regulation on the management of the waste of hazardous and toxic materials <sup>11</sup> (No. 18/1999 Juncto Government) Regulation 85/1999; Revision ongoing)	Ministry of Environment	Hazardous waste management
Classification and labelling (GHS)	Decree of Minister of Industry regarding Globally Harmonized System of Classification and Labelling of Chemicals <sup>12</sup> (No. 23, 2013 (Revised since Decree No. 87, 2009)	Ministry of Industry	Use of safety data sheets and labelling is necessary. All single chemical substances had to implement GHS since March 2010; GHS for chemical mixtures is currently voluntary, however after December 2016 it is also compulsory. <sup>13</sup>
Import/Export/Trade	Regulation of the Trade Minister on the procurement, distribution and control	Ministry of Trade	Inclusion of procurement, distribution, licensing, reporting, ban, and control of hazardous substances with regard to trade.

	of hazardous substances <sup>14</sup> (Regulation; No 42, 2009)		
Pesticides	Government Regulation No. 7/1973 on Control of Distribution, Storage and Use of Pesticides	Ministry of Agriculture	The scope covers governance on use/handling of pesticides in the country.
Occupational Health and Safety	Occupational Safety Act (Act no:1 of 1970) <sup>15</sup>	Ministry of Manpower and Transmigration	Safety inspections, accident reporting are addressed in the Act.
Transportation of Dangerous Goods	No specific legal instrument		

Under the Ministry of Environment, the following activities are currently in progress<sup>7</sup>:

- Drafting regulation on storage and transport of hazardous substances.
- A technical team for Hazardous Substances
- Preparation of a Chemicals Act
- Revision of Government Regulation No. 74 Year 2001 regarding Hazardous and Toxic material Management
- More future cooperation with SAICM

### 3.3 Laos

**Table 2.7: Key legal instruments related to CAPP in Lao PDR**

	Legal Instruments	Focal Agency	Further Description
Hazardous substances management	Environment Protection Law (No. 02-99/NA, 1992) <sup>37</sup>	Science, technology and Environment Agency	Includes environment assessment, preventing and countering disasters, pollution control of toxic chemicals, environment management and monitoring and environmental inspections
Classification and labelling (GHS)	GHS is not yet implemented		
Import/Export	Regulation on Control of Imports, exports and Consumption of Ozone Depleting Substance (No. 2358/STEA-PMO, 2004)	Ministry of Science and Technology	Registration and approval and reporting for import/export of chemical substances which are ozone depleting substances.
Pesticides, Cosmetics and Drugs	Agriculture Law (No. 105/PO, 1998)	Ministry of Agriculture and Forestry	Fertilizers and insecticides - to control the import, transport, distribution, storage, and other related activities
	Regulation on Use and Management	Ministry of Agriculture and	Pesticide management and inspections, registration for import



	of Pesticides in Lao PDR (No. 0886/MAF, 2000) <sup>16</sup>	Forestry - Department of Agriculture	
	Law on Drugs and Medical Products (No. 01/NA, 2012)	Ministry of Health	Conditions on business for production, import and export, and inspections
Occupational Health and Safety	Labour Law (No. 06/NA, 2006) <sup>17</sup>	Ministry of Labour and Social Welfare	Labour protection and inspections
Transportation of Dangerous Goods	No specific legal instrument for chemicals safety or hazard communication in transport sector		

Although there is no specific mandate or regulation, the Ministry of Industry and Handicraft is considered to be responsible for chemical substances used or produced in industrial processes in the country.<sup>18</sup>

Hazardous Chemicals Strategic Plan for 2006-2020 and the Hazardous Chemicals Action Plan for 2006-2010 have been drafted. These Plans are designed to provide a framework for the safe and effective management of chemicals.<sup>19</sup>

### 3.4 Malaysia

**Table 2.2: Key legal instruments related to CAPP in Malaysia<sup>20</sup>**

Focus Area	Legal Instrument	Focal Agency	Further Description
Hazardous substances management	Environmental Quality Act 1974	Department of Environment	
	Environmental Quality Act 1974 Environmental Quality (Scheduled Wastes) Regulations 2005	Department of Environment	Disposal of chemical waste
Classification and labelling (GHS)	Occupational Safety and Health (Classification, Labelling and Safety Data Sheet of Hazardous Chemicals) Regulations, 2013	Department of Occupational Safety and Health (DoOSH)	Inventory of hazardous chemicals required
Import/Export/Trade	Regulation of the Trade Minister on the procurement, distribution and control of hazardous substances <sup>21</sup> (Regulation; No 42, 2009)	Ministry of Trade	Inclusion of procurement, distribution, licensing, reporting, ban, and control of hazardous substances with regard to trade.
Pesticides, drugs or food	Pesticides Act 1974	Pesticides Board	Regulates management of pesticides use and handling
	Control of Drugs and	Ministry of Health	

	Cosmetics Regulations 1984		
Occupational Health and Safety	Occupational Safety and health (OSH) Act 1994  OSH (Employers' Safety And Health General Policy Statements) (Exception) Regulations 1995	Department of Occupational Safety and Health (DoOSH)	Safety inspections, accident reporting are addressed in the Act.
Import/Export	Customs Act 1967	Royal Malaysia Customs	Industrial chemicals import/export
	Poisons Act 1952 Food Act 1983	Ministry of Health	Chemicals related to drugs and food
Transportation of Dangerous Goods	No specific legal instrument yet		

### 3.5 Myanmar

**Table 2.5: Key legal instruments related to CAPP in Myanmar**

Focus Area	Legal Instrument	Focal Agency	Further Description
Hazardous substances management	Private Industrial Enterprise Law, 1990 (The State Law and Order Restoration Council Law No. 22/90)	Ministry of Industry	Governs registration of private industries -
	Petroleum Act (1934)	Multi-agency	Regulates the import, transport and storage of petroleum products
	Oilfields Act 1918 <sup>22</sup>	Multi-agency	Governs the activities in oil and gas fields
Classification and labelling (GHS)	GHS not yet implemented		
Pesticides, Biocides & Disinfectants	Pesticide law (1990), The State Law and Order Restoration Council Law No. 10/90	Registration Board, Ministry of Agriculture and Irrigation	Formation of the registration board to oversee regulatory activities for

			pesticide use and handling in the country
Occupational Health and Safety	Factories Act (1951) Oil Fields (Labour and Welfare) Act 1951 <sup>23</sup>	Factories and General labour laws Inspection Department	
Transport of Dangerous Goods	No specific legal instrument for chemicals safety or hazard communication in transport sector		

Myanmar established the National Commission for Environmental Affairs, in 1990. Among its programs, Myanmar has adopted Agenda 21, one part of which is to promote the environmentally sound management of toxic chemicals and hazardous waste. There is no specific institution assigned to the task of overall management of chemicals and waste, but there are a number of existing frameworks in legislation, classification and labelling standards that could accommodate the GHS. Myanmar is currently preparing to revise existing legislation and administrative procedures to implement the GHS.<sup>24</sup>

A law regarding safe use and disposal of hazardous chemicals has been drafted by the Myanmar Responsible Care Council (MRCC) along with the support from relevant government authorities and experts. The draft also included adoption of GHS in Myanmar. In 2011, the draft was approved by the Parliament.<sup>25</sup> However, it has not been officially enforced by the authorities. Currently the Ministry of Industry and the MRCC have done several consultative and capacity building programmes with regard to GHS in the industrial zones.

### 3.6 Philippines

**Table 2.3: Key legal instruments related to CAPP in Philippines**

Focus area	Acts	Focal Agency	Further Description
Hazardous substances management (New Chemical substances/inventory and pre-import notifications)	Toxic Substances and Hazardous and Nuclear Wastes Control Act, 1990 <sup>26</sup> (Republic Act No. 6969)	Department of Environment and Natural Resources	To regulate, restrict, or prohibit the importation, manufacture, processing, sale, distribution, use, and disposal of such materials
	DENR Administrative Order No. 29, Implementing Rules and Regulations of Republic Act 6969 - Title II: Toxic Chemical Substances <sup>27</sup>	Department of Environment and Natural Resources (DENR) – Chemicals Management Section	Consists the following: Philippines Inventory of Chemical and Chemical Substances (PICCS)  Priority Chemical List (PCL) – list of highly hazardous chemical substances that have been identified.  Chemical Control Order (CCO) - regulate, prohibit or limit priority concerned chemicals

			Notification of New Chemicals (pre-manufacture pre-importation notification - PMPIN) Small Quantity Importation Clearance (SQI)
Classification and labelling (GHS)	Joint Administrative Order No. 01 Series of 2009 for The Adoption and Implementation of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) <sup>28</sup>	Multi-agency cooperation: Department of Agriculture (DA); b. Department of Environment and Natural Resources (DENR); c. Department of Finance (DOF); d. Department of Health (DOH); e. Department of Interior and Local Government (DILG); f. Department of Labor and Employment (DOLE); g. Department of Transportation and Communications (DOTC); and Department of Trade and Industry (DTI).	Creation of a National GHS Implementing and Coordinating Committee; the mandate (duties and responsibilities for each competent authority has been determined.
	Rules and Procedures for the Safety Data Sheet (SDS), Labeling Requirements and Hazards Classification under DENR Administrative Order No. 29, Series of 1992 of Republic Act 6969 for the Adoption and Implementation of the Globally Harmonized System (GHS) <sup>29</sup>	Department of Environment and Natural Resources	Transition period in four implementing stages Preparation and Submission of SDS and labels. Screening, Review and Verification, Inspection Specific Requirements and Standards, Creation of GHS review committee, Monitoring procedure
	Guidelines for the implementation of GHS in chemical safety program in the workplace <sup>30</sup> (Department Order no:	Department of Labour and Employment	Applies to all workplaces engaged in the manufacture, use, storage of chemicals in the private sector, including their supply chain. Aims to protect workers and properties from the hazards of chemicals and to

	136-14, Series of 2014)		prevent or reduce the incidence of chemically induced accidents, illnesses and injuries and death resulting in the use of chemicals at work. In particular, it indicates that the workplace should establish a chemical safety program with the following elements: Control measures, PPE, emergency preparedness and response Monitoring agency – Bureau of Working Conditions
Pesticides, Biocides & Disinfectants	Presidential Decree 1114 creating the Fertilizer and Pesticide Authority, Year 1977 <sup>31</sup>	Fertilizer and Pesticide Authority (FPA)	FPA is mandated to regulate both fertilizers, pesticides, and other agricultural inputs during import, formulation, storage, use and disposal
Occupational Exposure Limits & Protection	Occupational Safety and Health Standards, 1989 <sup>32</sup>	Department of Labour and Employment	Workers exposed to nature of work with chemicals are considered as 'hazardous workplaces'; occupational exposure limits are included; PPE requirements are included. Under the standards, Rule 1090 specifically addresses hazardous materials.
Transport of Dangerous Goods	No specific legal instrument		
Petroleum Products and its activities	Petroleum Act, Republic Act no: 387, Year 1949	Department of Energy	
	Implementing Rules and Regulations (IRR) of the Downstream Oil Industry Deregulation Act of 1998.	Department of Energy	Addresses the entire life cycle of petroleum and LPG products which includes, import, processing, refining, transport, storage and distribution.

### 3.7 Thailand

**Table 2.4: Key legal instruments related to CAPP in Thailand**<sup>33,34</sup>

Focus area	Legal Instrument	Focal Agency	Further Description
Hazardous substances management ( includes chemical substances inventory and import/export)	Hazardous Substances (HS) Act B.E. 2535, 1992	Ministry of Industry (Department of Industrial Works)	Establishment of an advisory body known as the Hazardous Substance Control Committee and the creation of a permit system for import, export, production, distribution, use, and disposal of the specified hazardous substances.  To establish an Information Center for Hazardous Substances at the Ministry of Industry as a coordinating center with respect to information on hazardous substance
	Latest amendment - Hazardous Substance Act (No. 3), B.E. 2551 (2008)		

			<p>for various government agencies including private sectors for the collection and other information services related to hazardous substances.</p> <p>HS are classified into 4 types according to the needs for control of production, import, export, having in possession:</p> <ul style="list-style-type: none"> <li>- Type 1 must comply with criteria</li> <li>- Type 2 must be notified</li> <li>- Type 3 must obtain a permit, severe restrict</li> <li>- Type 4 prohibit or ban</li> </ul>
	Public Health Act, 1992	Ministry of Public Health	Regulates management of health risks caused by chemicals and authorizes permission to take action in the event of an occurrence (chemical accident) which causes serious harm to health.
	Enhancement and Conservation of National Environment Quality Act, 1992	Ministry of Natural Resources and Environment, Pollution Control Department	Regulates the standards for water, air, noise and manages pollution control and conservation of the environment.
	Industrial Estate Authority of Thailand (IEAT) Act, 1979	Industrial Estate Authority of Thailand	Establishment of IEAT, siting and land use planning, general management of industrial estates, supervision of working personnel.
Classification and labelling (GHS)	Hazard Classification and Communication System of Hazardous Substances B.E. 2555 (2012)	Ministry of Industry	The use of the GHS as a requirement on hazard classification and communication of hazardous substances
Pesticides, Biocides & Disinfectants	Fertilizer Act, 1975	Ministry of Agriculture and Cooperatives	Management of production, sale and possession for sale, import or import in transit of chemical fertilizers is controlled by a permit and registration system.
Occupational Health and Safety	Factory Act, 1992	Department of Industrial Works - Ministry of Industry	Seeking to control factory operations regarding waste disposal, pollution emission and contamination with the main objective of minimizing the impact on the environment.
	Occupational Safety Health and Environment (OSHE) Act	OSH Bureau, Department of labour protection and welfare.	Administration, management and operational requirements to be satisfied by employers.  Establishment of OSHE committee

			<p>consisting of competent authorities.</p> <p>Guidelines to be followed in the event of an accident. Role and responsibilities of a safety inspector.</p> <p>Establishment of OSHE Institute for promotion of OSHE.</p>
Transportation of Dangerous Goods	Land Transportation of Hazardous Substance B.E. 2546 (2003) (Notification of Ministry of Industry under Hazardous Substances Act) <sup>35</sup>	Department of Industrial Works	Require a permit and need to meet specific requirements stated by the authority for land transportation of hazardous substances

### 3.8 Vietnam

**Table 2.8: Key legal instruments related to CAPP in Vietnam**

	Legal Instrument	Focal Agency	Further Description
Hazardous substances management; Classification and labelling (GHS); Import/Export	<p>Chemical Law (06/2007/QH12), 2007</p> <p>Several relevant regulations/decrees under the chemical law have been enacted since 2007 addressing different elements of CAPP.<sup>36</sup></p>	Vietnam Chemicals Agency, Ministry of Industry and Trade	<p>Governs chemical handling, and safety in chemical handling. Includes registration of new chemicals, import, storage and handling, production, packaging, disposal, export, classification and labelling (GHS).</p> <p>Addresses right and obligations of organizations and individuals engaged in chemical handling, and state management of chemical handling (inspections, organisational structure etc..).</p>
Pesticides, Cosmetics or Drugs	Ordinance on Plant Protection and Quarantine, (No: 36/2001/PL-UBTVQH10), 1993	Ministry of Agricultural and Rural Development	Regulates activities relating to the prevention and management of injurious pests, plant quarantine and pesticide management, The regulation has not been yet upgraded to become a law.
Occupational Health and Safety	Labour Code, (10/2012/QH13), 2012 (Revised) <sup>37</sup>	Ministry of Labour - Invalids and Social Affairs	Address occupational health and safety, training requirements, labour

			inspections
Transportation of Dangerous Goods	Decree No. 104/2009/ND-CP, 2010 of the Government providing for the list of dangerous goods and the transport of dangerous goods by road motor vehicles <sup>38</sup>	Ministry of Transport	List of dangerous goods, classification and labelling, transport permits.

### 3.9 Analysis of the current status of legislation in the region

Indonesia, Thailand and Vietnam have specific legal instruments addressing chemical or hazardous substances. They have also adopted the implementation of UN's Globally Harmonised System (GHS) for classification and labelling of chemical substances (Indonesia – Effective from March 2010 for substances; mandatory for mixtures from December 2016, Thailand - Effective from March 2013 for substances; mandatory for mixtures from March 2017, Vietnam - Effective from March 2014 for substances; mandatory for mixtures from March 2016)<sup>39</sup>.

Although Malaysia does not have a separate regulation for hazardous substances, it has addressed the important aspects required for governance on CAPP. Its key legal instrument with regard to CAPP is Occupational Health and Safety Act 1994. Underneath this Act, several regulations on safety inspections, accident reporting, chemical exposure standards, control of major accidents and recently regulation on GHS (October, 2013<sup>40</sup>) have been enacted.

In Philippines, chemicals management is mainly addressed under the Toxic Substances and Hazardous and Nuclear Wastes Control Act (1990)<sup>18</sup>. Department of Environment and Natural Resources is stringently regulating the import and use of chemical substances in the country by categorising it to its respective regulatory guidelines depending on its level of toxicity or hazardous nature (PICCS, PCL, CCO, and PMPIN). Recently in 2014, a legal instrument under the Department of Labour and Employment was released to enforce all workplaces of the chemicals sector to implement a chemical safety program and to incorporate GHS as one of the program requirements.

Although there are certain basic legal instruments in Cambodia and Lao PDR, it can be observed that their respective regulations do not directly address the needs for chemicals management or safety. Both these countries also do not have any system for information management such as inventories of hazardous installations and chemicals being imported and used/handled in the country.

Myanmar's legal instrument seems to be outdated because most of them have been enacted during the British rule in the 19<sup>th</sup> century. Unlike rest of the ASEAN countries, the current legal framework lacks many fundamental regulatory aspects on CAPP such as information management systems, classification and labelling requirements of chemical substances and industry inspections. However, Myanmar is



currently in the midst of political, socio-economic, environmental and technological transitions which are improving its ease of trade and economic sanctions<sup>41</sup>. Subsequently, this will enable the development of chemical industries in the country. Therefore, Myanmar needs to immediately consider drafting or revising appropriate legal instruments and improving its administrative procedures and organisational structure for governance on sound chemicals management.

In general, the current situation regarding legislation on CAPP varies among the eight ASEAN countries. However, most of them are lacking or do need to strengthen the following elements in their legal framework for CAPP: specific guidelines and compliance for siting and land-use planning of hazardous installations; a standardised inspection programme focusing on (major) hazardous installations, off-site preparedness planning; and accident reporting and investigation procedures.

## **4 Centres of Excellence for CAPP**

### **4.1 Regional organisations and/or activities**

#### **a) ASEAN Chemical Industries Council<sup>42</sup>**

The ASEAN Chemical Industries Council is a regional group under the ASEAN charter and comprises the following national chapters: Chemical Industries Council – Malaysia, Singapore Chemical Industries Council, Chemical Industry Association of Philippines (SPIK), Indonesia Chemical Industry Club, and Federation of Thai Industries.

#### **b) Asia Pacific Economic Cooperation's Chemical Dialogue<sup>43</sup>**

Asia Pacific Economic Cooperation (APEC)'s Chemical Dialogue (CD) serves as a forum for regulatory officials and industry representatives to find solutions to challenges facing the chemical industry and users of chemicals in the Asia-Pacific region. It reflects APEC members' recognition of the importance of engaging with the private sector and building public-private sector dialogue and cooperation for mutual benefit. APEC consists of the following 21 members: Australia, Brunei Darussalam, Canada, Chile, China, Hong Kong, Indonesia, Japan, Korea, Malaysia, Mexico, New Zealand, Papua New Guinea, Peru, Philippines, Russia, Singapore, Chinese Taipei, Thailand, United States and Vietnam.

Issues addressed include chemical sector liberalisation, chemical trade facilitation and capacity building. The CD also focuses on improving regulatory policies and practices: it seeks workable regulatory programmes which ensure that regulatory, safety, and environmental goals can be implemented by both governments and businesses.

#### **Key Achievements of APEC's Chemical Dialogue:**

The CD has been active in promoting implementation of the United Nation's Globally Harmonized System of Classification and Labelling of Chemicals (GHS) by APEC member economies. Over the years

the CD has conducted numerous workshops to provide economies with information on the GHS and to build capacity to facilitate its adoption.

In 2008, APEC Ministers endorsed the report of the CD's Virtual Working Group on GHS implementation issues entitled 'Developing Clarity and Consistency in the Implementation of the Globally Harmonized System for the Classification and Labelling of Chemicals' as an APEC contribution to the UN's Strategic Approach to International Chemicals Management (SAICM). APEC has also shown regional leadership by contributing the ground-breaking APEC Best Practices for Chemical Regulation to the SAICM. The guidelines were formulated by APEC officials and industry representatives, and endorsed by APEC Ministers.

The CD is also addressing APEC member economies' and regional manufacturers' concerns about the potentially trade-distorting effects of the European Union's regulation on Registration, Evaluation and Authorisation of Chemicals (REACH) legislation. The CD has undertaken to coordinate APEC engagement with the EU on these issues, and in 2008, the CD endorsed and transmitted to the European Commission a set of questions and letters on REACH implementation.

**c) Capacity building activities on GHS and chemicals management policy by Ministry of Economy, Trade and Industry (METI), Japan<sup>44</sup>**

Since 2003, METI with the support from Japan External Trade Organisation (JETRO) has assisted most of the ASEAN countries regarding GHS adoption and chemicals management through organizing training courses in Tokyo, and holding seminars and workshops by dispatching experts to the host countries. Japan has implemented GHS and it is fully in effect under its Industrial Safety and Health law, and it is interesting to note that the METI has a separate division for chemicals management policy.

**d) Economic Research Institute for ASEAN and East Asia (ERIA) Research** - ERIA conducted a study on the Feasibility of and Information Infrastructure for the Future Chemicals Management Scheme in the Asian Region<sup>45</sup> to research on the potential for an effective regional information collection and management system of chemical hazard data which can reduce the cost and time consumed by individual countries, and also for harmonisation of chemical management systems by using the same data in all countries of the region. This research will seek to answer how an information infrastructure, including a data center, should be established, on the basis of other examples, including existing chemicals databases and multilateral databases in other areas. It will take into account its economic impact and how an effective and efficient chemical management system in the region can be developed.

## 4.2 National Centres of Excellence

**Table 3: Possible National Centres of Excellence for CAPP**

Country	Name of the Centre of Excellence	Further information
Indonesia	<ol style="list-style-type: none"> <li>1. Komite Nasional Responsible Care, Indonesia</li> <li>2. Himpunan Kimia Indonesia, Indonesian Chemical Society</li> <li>3. Universitas Indonesia (University of Indonesia), Department of Chemical Engineering and Department of Industrial Engineering</li> </ol>	
Malaysia	Chemical industries Council of Malaysia (CICM)	The CICM represents various sectors of the chemical industry. It acts as the channel of communication with the government, and it also acts as a forum for members to discuss about mutual issues. The CICM promotes continuous improvement on health, safety and environment aspects by being the focal point for Responsible Care. <sup>46</sup>
Myanmar	The Chemical Industry Group of the Myanmar Industries Association	The focal point for Myanmar Responsible Care Council <sup>47</sup> . The MRCC recently joined the Responsible Care Global network in 2012. Since then it has been involved in advocating for sound chemicals management within the country. The MRCC has played an active role in developing the chemical safety law and also in conducting different awareness raising workshops.
Philippines	Chemical Industries Association of Philippines (SPIK) <sup>48</sup>	The Samahan sa Pilipinas ng mga Industriyang Kimika (SPIK) is an association of chemical industries whose main role is to address the issues involving their business. SPIK studies matters essential to the development of the chemical industry, which range from topics such as trade, competitiveness, opportunities, and environmental regulations, policies and practices. Through a number of working committees, SPIK proposes legislation for the protection and improvement of the chemical

		industry. SPIK is the national focal point for Responsible Care, and is also active in the ASEAN region.
Thailand	Federation of Thai Industries Chemical Industry Club (FTI) – National Focal Point for Responsible Care <sup>49</sup>	The Chemical Industry Club (CIC) of the Federation of Thai Industries (FTI) was established 31 years ago and has nearly 150 members making it the second biggest sector group in FTI. The CIC is a non-profit organization operating as a center for dissemination of information, knowledge, regulations, etc. for members, and interacts with concerned governmental agencies on behalf of members. CIC is closely involved in chemicals management and chemical safety programs as well as promotion of the ICCA’s Responsible Care program through the Responsible Care Management Committee of Thailand. CIC also participates in meetings with all levels of government and other organizations for policy formulation and regulation implementation.
	<ol style="list-style-type: none"> <li>1. Mahidol University</li> <li>2. Chulalongkorn University, Faculty of Engineering</li> </ol>	
Vietnam	Chemical Society of Vietnam	Lead facilitator for Vietnam Responsible Care Council <sup>50</sup>

Cambodia, Indonesia, Laos, and Vietnam have established their respective national cleaner production centres (NCPC) under a joint initiative programme of UNIDO and UNEP promoting resource efficiency and cleaner production (RECP) concepts in developing countries and economies in transition.<sup>51</sup> The purpose of NCPCs is to build local capacity to promote and implement preventive environmental approaches especially ‘cleaner production’ (intended to minimise waste and emissions and maximise product output). They operate as a resource center working closely with the industry and the government by mainly focusing on awareness raising, capacity building, technical assistance or policy advice activities. Although their main focus is on Cleaner Production, due to their close ties with the industry and the government, they potentially do have the capacity in promoting the need for CAPP to industries and also providing policy advice to national governments regarding governance on CAPP.<sup>52</sup>

## **5 Challenges and limitations faced regarding safety of chemical industries in ASEAN region**

Certain countries such as Malaysia, Thailand, Indonesia and Vietnam have well-established chemical industries in comparison to their other neighbouring countries. As a result, over the years, they have gained political commitment and have addressed the regulatory needs for CAPP.

The chemical industries in ASEAN developing countries such as Myanmar and Lao PDR are small scale in comparison to the above mentioned countries. There is less political will towards recognising the need for a sound management of chemicals and accident prevention and preparedness mechanisms. Due to the prevailing poverty in these developing countries and the lack of awareness regarding safety aspects, establishing an infrastructure and governance for chemicals safety is perceived to be expensive by respective governments and their industries.

However, the growing market for chemicals sector in Asia is subsequently enabling expansion of chemical industries and related activities in other ASEAN countries other than in the countries with well-established systems for CAPP. There is also an increasing trend of multi-national companies shifting their industrial operations towards ASEAN countries. This increasing industrialisation is an emerging concern to the government authorities of developing countries who are lagging behind in addressing CAPP. As indicated in Sections 2 and 3, consultative and awareness raising activities have been initiated by respective competent authorities with the cooperation of national industry associations. In overall, most of these lagging countries have inadequate capacity and lack an organisational structure to coordinate sound chemicals management and/or CAPP. In particular, there is a misconception between preventive measures and response mechanisms for a chemical accident. These countries also lack the capacity or know how to effectively formulate functional legal instruments on CAPP. Lack of financial resources or fund mobilisation for capacity building or infrastructure development is another major limitation faced by these countries.

Regardless of the varying current situations for CAPP in individual ASEAN countries, the common challenge that is faced by all of them is lack of stringent enforcement due to inadequate administrative or technical capacity, and poor monitoring compliance. Multi-agency cooperation and private-public partnerships need to be further strengthened in determining strategic and effective solutions for governance on CAPP. Another drawback is that there is poor practice in considering learned lessons from past accidents for review and improvement of existing systems. Methodologies on risk assessment and post-accident analysis are not widely used by competent authorities and/or industrial sector. There is a general lack of understanding about process safety and unsafe work practices. The major challenge is in drafting regulations or designing industrial processes according to local context while using European or United States practices and standards as a model.

## **6 Disaster Risk Reduction and potential for inclusiveness of CAPP under regional activities**

The United Nations International Strategy for Disaster Reduction (UNISDR) has been the main advocate for raising awareness on the impacts of disasters and of building resilience of societies since 2000 via a multi-stakeholder approach. UNISDR is the focal point of the Hyogo Framework for Action (HFA), which is the global blueprint for disaster risk reduction (DRR) efforts for the 2005-2015 decade. UNISDR has taken a multi-stakeholder approach in order to enhance society's resilience towards disasters.<sup>53</sup>

### **6.1 Regional Cooperation on Disaster Risk Reduction**

Regarding regional cooperation, several disaster risk reduction (DRR) programmes and activities have taken place, and governments have taken the initiative in organising regional ministerial conferences and other initiatives through sub regional networks, as listed below.

- a) The Asia Ministerial Conference for Disaster Risk Reduction (AMCDRR) is a biennial conference in the Asian region to ensure political and stakeholder's commitment towards DRR implementation. Five AMCDRR conferences have been organized by countries in Asia in collaboration with the UNISDR since 2005. These conferences have successfully brought together key stakeholders including governments, regional inter-governmental organizations, technical and scientific institutions involved in disaster risk reduction, non-governmental organizations, the private sector, donors and the media. The outcomes of these conferences are used by national states, sub-regional organizations and development partners to align priorities and seek investment opportunities.<sup>54,55</sup>
- b) ASEAN Coordination Centre for Humanitarian Assistance on disaster management (AHA Centre) is an inter-governmental organisation established by 10 ASEAN Member States; Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Viet Nam, to facilitate the cooperation and coordination among ASEAN Member States and with the United Nations and international organisations for disaster management and emergency response in ASEAN Region. AHA Centre was established on 17 November 2011 and it serves the Member States from its office in Jakarta.<sup>56</sup>
- c) SAARC Disaster Management Centre (SDMC) was set up in October 2006 at the premises of National Institute of Disaster Management in New Delhi. The SDMC serves the Member Countries by providing policy advice and facilitating capacity building services including strategic learning, research, training, system development, expertise promotion and exchange of information for effective disaster risk reduction and for planning and coordinating a rapid regional response mechanism to disasters within the region. The Centre has the mandate to serve eight Member Countries of SAARC- Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka.<sup>57</sup>

## 6.2 National Policies on Disaster Risk Management

Table 4 shows key national legal instruments related to disaster risk management of selected ASEAN countries.

**Table 4: Legal instruments on disaster risk management in selected ASEAN countries**

Country	Legal Instrument	Focal Agency	Inclusion of industrial disaster management or risk reduction
Indonesia	Law of the Republic of Indonesia concerning Disaster Management (Number 24 of 2007 ) <sup>58</sup>  Under the law, several regulations are present.	National Disaster Management Agency	Although it does not specifically mention chemical accident, non-natural disasters due to technological failure is included. Under pre-disaster stages – disaster risk reduction and prevention is mentioned. The law indicates that environmental management regarding disasters will also be supervised.
Malaysia	OSH (Control of Industrial Major Accident Hazards) Regulations 1996 <sup>59</sup>	Department of Occupational Safety and Health (DoOSH)	Includes preparation of emergency plans for major hazard installations and notification of major accidents.
	National Security Council Directive No. 20 (MKN 20) <sup>60</sup>	National Security Division	National policy on disaster management; industrial accidents due to hazardous substances is also covered under the directive.
Philippines	Disaster Risk Reduction and Management Act, 2010 <sup>61</sup>	National Disaster Risk Reduction and Management Council	Main focus on natural disasters only
Thailand	Disaster Prevention and Mitigation Act, 2007 <sup>62</sup>	Department of Disaster Prevention and Mitigation (DDPM)	Inclusion of chemical accident as a man-made disaster, general emergency response plans depending on severity of a disaster is also mentioned.
Myanmar	Disaster Management Law (2013) <sup>63</sup>	Disaster Preparedness Agency	Presently, the main focus is on institutional strengthening for natural disasters.
Cambodia	Disaster Management Law is yet to be approved <sup>64</sup> ;	N/A	National Committee for Disaster Management has been established for

	Sub-decree No. 30 ANKR.BK, dated 9 April 2002 on the Organization and Functioning of the National and Sub-National Committees for Disaster Management		overall coordination. Chemical/industrial accidents not yet considered under disaster management activities
Laos	The legal definition of a disaster is only stated in Article 17 of the Environmental Protection Law (1992) <sup>37</sup>	Science, technology and Environment Agency	
	Prime Minister's Decree No. 158 (1999) on the Establishment of a National Disaster Management Committee (NDMC)		
Vietnam	Natural Disaster Prevention and Control Law was newly enacted in 2013 <sup>65</sup>	Disaster Management Centre	
	Chemical Law (06/2007/QH12), 2007	Vietnam Chemicals Agency, Ministry of Industry and Trade	The Chemical Law specifies CAPP. Separate chapters for accident prevention and mitigation and environment protection and community safety.

#### 6.4 Inclusiveness of CAPP under regional disaster risk reduction activities

As indicated in Table 4 of Section 6.2, Indonesia, Thailand and Malaysia are the only countries that have recognised industrial, chemical or technological hazards into the scope of their respective national disaster management laws. The newly promulgated Vietnam's disaster management law focuses only on natural disasters. However chemical accident prevention and mitigation (preparedness and response plans) are separately addressed in its Chemical Law (Law No: 06/2007/QH12). The legislation for disaster management of other respective countries does not mention any consideration of industrial/chemical accidents and their main focus seems to be on natural disasters. Laos and Cambodia have only established national councils/committees to coordinate their respective national and local DRR activities and are yet to officially pass a separate law for disaster management. Another interesting observation is that Indonesia, Thailand Malaysia are also the three countries, as indicated in Section 3.2, which have legal instruments that satisfactorily address hazardous substances management in comparison to the other developing ASEAN countries.

UNISDR considers chemical accidents as a technological disaster.<sup>66</sup> Chemical hazards are also being recognised by UNISDR programmes under the nuclear, biological and chemical (NBC) category as one of the list of hazards that can cause a disaster. Although technological hazards are acknowledged in the HFA, its main focus is on disaster risk reduction regarding natural/hydro-metrological disasters. As shown in Section 6.2, most of the national policies on disaster risk reduction also do not directly address



emergency preparedness or response for industrial disasters. Regional DRR programmes are also not assigning any consideration to technological disasters because the region is mainly prone to devastating natural disasters.

However, there is interest regarding private-public sector cooperation to address preparedness and risk reduction of private sector or industries particularly from na-tech disasters (natural disasters triggering technological disasters e.g. Japan's Fukushima Disaster, Hurricane Katrina and Rita's impact on offshore oil and gas production in the Gulf of Mexico<sup>67</sup>). The 6<sup>th</sup> Asian Ministerial Conference that is to be held in Bangkok this June 2014 is also addressing the following as one of the sub themes of the conference: *'Private Sector Role – Public & Private Partnership for Disaster Risk Reduction'*. The outcomes will be forwarded as recommendations to the ongoing discussion on the post-2015 framework for DRR (HFA2).<sup>68</sup>

Therefore, it will be beneficial for CAPP activities to be included under regional and national DRR programmes because there is a strong regional commitment for disaster risk reduction by key multi-stakeholders due to Asia being the most disaster-prone region. This will subsequently assist in reaching out to Ministers or senior leaders of a country and also access to fund mobilisation and long term public funding for sound chemicals management. Presently, several global and regional platform consultations are being carried out for the post 2015 framework for disaster risk reduction (HFA2) to analyse the gaps in the current HFA and provide recommendations for development of HFA2. Therefore, there is potential to consider CAPP as an appropriate mechanism for technological disaster risk reduction under the post 2015 framework of action (HFA2).

## **7 The Benefits of Regional Cooperation on CAPP in Asia**

Regional cooperation on CAPP can be effective in strengthening respective national programmes and initiatives in place because the countries have a better understanding of challenges or limitations being faced within the region, which can improve information and risk sharing.

As observed in Sections 3 and 5, countries like Indonesia, Thailand, Malaysia and Vietnam who have established appropriate legal instruments and satisfactory governance regarding CAPP, can provide technical assistance to other lagging regional countries in up scaling their legislative framework and capacity building activities. It will ensure consistency (particularly the use of GHS) across the region that will improve trade between each other and from outside which will subsequently benefit in accelerating the overall economic growth of the chemical industry in Asia. Regional cooperation can give rise to peer pressure which can encourage the lagging countries to take necessary initiatives towards governance on CAPP. Countries can also benefit from access to funding support from potential regional donor countries (e.g. Japan, Korea and China) and better fund mobilisation across the region.

It can be derived that countries do require regional cooperation in the following two different aspects:

- Policy dialogue forums or working groups to support in formulation of national legislation and public administration practices regarding CAPP
- Cross-regional knowledge networks between centre of excellence (universities, research centres, and industry associations) and competent authorities regarding development and capacity building on technical aspects of CAPP such as information databases, related software and tools, process safety methodologies etc.

## **8 Conclusion**

As indicated in this report, the chemicals sector in Asia is rapidly expanding and subsequently there is an urgent need to develop and implement complementary processes to support the capability of developing countries for sound chemicals management and for integrating chemical safety issues into broader national development strategies. It is evident that such processes can be effectively achieved by regional cooperation because certain countries have gained valuable experience and also have adequate capacity (technical and/or financial) in supporting other lagging countries within the region.

Furthermore, it has been highlighted that although there is general consensus and strong political commitment across the Asian region towards the importance and urgency in addressing disaster risk reduction, insignificant attention has been shown towards consideration of technological disasters in comparison to natural disasters. This lacking component under the scope of overall DRR framework can be aptly addressed by CAPP programmes which can in turn benefit from using this active forum towards gaining political will and fund mobilisation prospects.

Therefore, regional cooperation and integration of CAPP activities into national and regional disaster risk reduction programmes should result in an effective way forward for overcoming the challenges faced by individual countries on chemical accident prevention and preparedness.

## REFERENCES

- <sup>1</sup> A. T. Kearney (2012) Chemical Industry Vision 2030 – A European Perspective. [ONLINE]. <https://www.atkearney.com/documents/10192/536196/Chemical+Industry+Vision+2030+A+European+Perspective.pdf/7178b150-22d9-4b50-9125-1f1b3a9361ef>. [Accessed on 25 April 2014]
- <sup>2</sup> United Nations Environment Programme (2012) UNEP's Global Chemicals Outlook towards sound management of chemicals – Synthesis report for decision makers. Accessed from [http://www.unep.org/pdf/GCO\\_Synthesis%20Report\\_CBDTIE\\_UNEP\\_September5\\_2012.pdf](http://www.unep.org/pdf/GCO_Synthesis%20Report_CBDTIE_UNEP_September5_2012.pdf)
- <sup>3</sup> ICIS Chemical Business (2013) Market outlook: Global chemical growth to be driven by the US, Asia, ICIS market intelligence. [ONLINE]. Available at: <http://www.icis.com/resources/news/2013/10/18/9716315/market-outlook-global-chemical-growth-to-be-driven-by-the-us-asia/>. [Accessed on 26 April 2014]
- <sup>4</sup> Singapore Economic Development Board (2013) Specialty Chemicals: Agents of Change. [ONLINE]. Available at: <http://www.edb.gov.sg/content/edb/en/resources/downloads/articles/specialty-chemicals.html>. [Accessed on 30 April 2014]
- <sup>5</sup> IHS Chemical Week (2014) Outlook 2014: Looking forward. [ONLINE]. Available at: [http://www.chemweek.com/lab/Outlook-2014-Looking-forward\\_57898.html](http://www.chemweek.com/lab/Outlook-2014-Looking-forward_57898.html). [Accessed on 01 May 2014]
- <sup>6</sup> Ministry of Environment Protection (2010) Cambodia Country Situation Report: CAPP Programme Project
- <sup>7</sup> International Labour Organisation (2011) The overview of occupational safety and health in Cambodia. [ONLINE]. Available at: [http://www.ilo.org/safework/countries/asia/cambodia/WCMS\\_187746/lang-en/index.htm](http://www.ilo.org/safework/countries/asia/cambodia/WCMS_187746/lang-en/index.htm). [Accessed on 01 May 2014]
- <sup>8</sup> Regulation of the State Minister for Environmental Affairs, No: 2 Year 2010, The Application of Electronic Registration System of hazardous and toxic substances in the framework of Indonesia National Single Window in the Ministry of Environmental Affairs (2010). [ONLINE]. Available at: <http://faolex.fao.org/docs/pdf/ins98700.pdf>. [Accessed on 01 May 2014]
- <sup>9</sup> Law of the Republic of Indonesia on Environmental Protection and Management. No. 32/2009. (2009). [ONLINE]. Available at: [http://www.fao.org/fishery/shared/faolextrans.jsp?xp\\_FAOLEX=LEX-AOC013056&xp\\_faolexLang=E&xp\\_lang=en](http://www.fao.org/fishery/shared/faolextrans.jsp?xp_FAOLEX=LEX-AOC013056&xp_faolexLang=E&xp_lang=en). [Accessed on 02 May 2014]
- <sup>10</sup> Government Regulation of the Republic of Indonesia No. 74/2001 on Hazardous and Toxic Substance Management President of the Republic of Indonesia (2001). [ONLINE]. Available at: <http://rulebook-jica.ekon.go.id/english/32.PP%2074%20TAHUN%202001.eng.html>. [Accessed on 02 May 2014]
- <sup>11</sup> Government Regulation on the management of the waste of hazardous and toxic materials (No. 18/1999 Juncto Government) (1999). [ONLINE]. Available at: <http://faolex.fao.org/docs/pdf/ins36549E.pdf>. [Accessed on 02 May 2014]
- <sup>12</sup> Y.W. Purwandari (2014) Seminar (Chemical management policy in Southeast Asia (Vietnam and Indonesia) latest trends) Presentation: Chemicals/Hazardous Substances Management in Indonesia. Tokyo, Japan. 20<sup>th</sup> February. Available at: [http://www.chemical-net.info/pdf/20140220\\_Seminar2\\_eng.pdf](http://www.chemical-net.info/pdf/20140220_Seminar2_eng.pdf). [Accessed on 03 May 2014]
- <sup>13</sup> Ministry of Industry of Republic of Indonesia (2013) Country Report - GHS Implementation in Indonesia. Regional GHS Review Conference for South East Asian Countries. . Kuala Lumpur, Malaysia. 22<sup>nd</sup> May. Available at: <http://www.miit.gov.cn/n11293472/n11293877/n14505342/n14506911/n14506987/n15432499.files/n15432493.pdf>. [Accessed on 03 May 2014]
- <sup>14</sup> Regulation of the Trade Minister on the procurement, distribution and control of hazardous substances No 42/2009 (2009). [ONLINE]. Available at: <http://faolex.fao.org/docs/pdf/ins91862.pdf>. [Accessed on 03 May 2014]
- <sup>15</sup> International Labour Organisation (n.d.) Natlex database: Occupational Safety Act No: 1 of 1970 - Indonesia. [ONLINE]. Available at: [http://www.ilo.int/dyn/natlex/natlex\\_browse.details?p\\_lang=en&p\\_country=IDN&p\\_classification=14&p\\_origin=COUNTRY&p\\_sortby=SORTBY\\_COUNTRY](http://www.ilo.int/dyn/natlex/natlex_browse.details?p_lang=en&p_country=IDN&p_classification=14&p_origin=COUNTRY&p_sortby=SORTBY_COUNTRY). [Accessed on 05 May 2014]
- <sup>16</sup> S. Kethongsa (2005) Presentation by Lao PDR. Proceedings Asia Regional Workshop Implementation, Monitoring and Observance International Code of Conduct on the Distribution and Use of Pesticides. Bangkok, Thailand. 26-28 July. Available at: <http://www.fao.org/docrep/008/af340e/af340e0c.htm>. [Accessed on 05 May 2014]

- 
- <sup>17</sup> International Labour Organisation (n.d.) Natlex database: Labour Law of Lao PDR, No: 6/NA of 2006. [ONLINE]. Available at: [http://www.ilo.org/dyn/natlex/natlex\\_browse.details?p\\_lang=en&p\\_country=LAO&p\\_classification=01&p\\_origin=SUBJECT](http://www.ilo.org/dyn/natlex/natlex_browse.details?p_lang=en&p_country=LAO&p_classification=01&p_origin=SUBJECT). [Accessed on 05 May 2014]
- <sup>18</sup> Lao PDR (n.d.) Presentation slides on GHS Implementation in Lao PDR, UNITAR. Available at: [www2.unitar.org/cwm/publications/event/ghs\\_asean.../Lao\\_PDR.ppt](http://www2.unitar.org/cwm/publications/event/ghs_asean.../Lao_PDR.ppt). [Accessed on 06 May 2014]
- <sup>19</sup> UNECE (n.d.) Lao PDR GHS implementation. [ONLINE]. Available at: [http://www.unece.org/trans/danger/publi/ghs/implementation\\_e.html#c25785](http://www.unece.org/trans/danger/publi/ghs/implementation_e.html#c25785). [Accessed on 06 May 2014]
- <sup>20</sup> M. B. Mokhtar, G.C. Ta (2009) Integrated and Holistic Management of Chemicals: Opportunities for Effective Multi-stakeholder Collaboration, *Malaysian Journal of Chemistry* [ONLINE]. Vol.11, No.1, 030-036. Available at: [http://www.ukm.my/myniche/doc/IKM%20journal%20\(MBM%20&%20GCT%202009\).pdf](http://www.ukm.my/myniche/doc/IKM%20journal%20(MBM%20&%20GCT%202009).pdf). [Accessed on 06 May 2014]
- <sup>21</sup> Regulation of the Trade Minister on the procurement, distribution and control of hazardous substances of Malaysia, No. 42 (2009). [ONLINE]. Available at: <http://faolex.fao.org/docs/pdf/ins91862.pdf>. [Accessed on 06 May 2014]
- <sup>22</sup> Oilfields Act 1918 - Burma (1918). [ONLINE]. Available at: [http://www.burmalibrary.org/docs16/Burma\\_Code-Vol-V-tu-comp.pdf](http://www.burmalibrary.org/docs16/Burma_Code-Vol-V-tu-comp.pdf). [Accessed on 07 May 2014]
- <sup>23</sup> Oil Fields (Labour and Welfare) Act 1951 – Burma (1951) ONLINE]. Available at: [http://www.ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/---sro-bangkok/documents/publication/wcms\\_120410.pdf](http://www.ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/---sro-bangkok/documents/publication/wcms_120410.pdf). [Accessed on 07 May 2014]
- <sup>24</sup> UNECE (n.d.) Myanmar GHS implementation. [ONLINE]. Available at: [http://www.unece.org/trans/danger/publi/ghs/implementation\\_e.html#c25802](http://www.unece.org/trans/danger/publi/ghs/implementation_e.html#c25802). [Accessed on 07 May 2014]
- <sup>25</sup> Lwin T. E. E. (2011) Manufacturers prepare for chemical safety law, *Myanmar Times*, May 16-22. [ONLINE]. Available at: <http://www.mmtimes.com/2011/news/575/news57511.html>. [Accessed on 07 May 2014]
- <sup>26</sup> Fuentes J. M., Ramirez N., Linsangan E. Philippine Chemical And Hazardous Waste Emergency Management Program (CHWEMP). UNITAR. [ONLINE]. Available at: [http://www2.unitar.org/cwm/publications/cw/tw/tw10/written/labour/Ninette\\_Ramirez\\_&\\_Enrique\\_Linsangan\\_E\\_nvi\\_%20Practitioners\\_Aso\\_Juan\\_Miguel\\_Fuentes.pdf](http://www2.unitar.org/cwm/publications/cw/tw/tw10/written/labour/Ninette_Ramirez_&_Enrique_Linsangan_E_nvi_%20Practitioners_Aso_Juan_Miguel_Fuentes.pdf). [Accessed on 08 May 2014]
- <sup>27</sup> Pan C. (2014) CIRS Webinar: An Introduction to New Substance Notification in Philippines, 18 February. Available at: [http://www.cirs-reach.com/Inventory/Introduction\\_to\\_new\\_substance\\_notification\\_in\\_Philippines\\_Ms\\_Cloris\\_Pan.pdf](http://www.cirs-reach.com/Inventory/Introduction_to_new_substance_notification_in_Philippines_Ms_Cloris_Pan.pdf). [Accessed on 07 May 2014]
- <sup>28</sup> Joint Administrative Order No. 01 Series of 2009 for The Adoption and Implementation of the Globally Harmonized System of Classification and Labelling of Chemicals in Philippines (2009). [ONLINE]. Available at: [http://cloud.eacomm.com/oshc2010/UserFiles/oshc2010/file/GHS-JAO-\(Joint-Admin-Order\)-Final-signed-copy.pdf](http://cloud.eacomm.com/oshc2010/UserFiles/oshc2010/file/GHS-JAO-(Joint-Admin-Order)-Final-signed-copy.pdf). [Accessed on 08 May 2014]
- <sup>29</sup> Rules and Procedures for the Safety Data Sheet (SDS), Labeling Requirements and Hazards Classification under DENR Administrative Order No. 29 (3<sup>rd</sup> draft), Series of 1992 of Republic Act 6969 for the Adoption and Implementation of the Globally Harmonized System – Philippines (n.d.). Available at: <http://www.emb.gov.ph/chemicals/docs/DRAFT%20DAO%20GHS-12-27-10%20-%20Rev2.pdf>. [Accessed on 08 May 2014]
- <sup>30</sup> Guidelines for the implementation of GHS in chemical safety program in the workplace, Department Order No: 136-14, Series of 2014 – Philippines, (2014). Available at: <http://www.dole.gov.ph/files/DO%20136-14.pdf>. [Accessed on 08 May 2014]
- <sup>31</sup> Department of Environment and Natural Resources, Environment Management Bureau, Republic of Philippines (2010) Country Situation Report - CAPP Programme Project. March. Philippines: Environment Management Bureau
- <sup>32</sup> Occupational Safety and Health Standards (1989), Philippines. [ONLINE]. Available at: [http://www.oshc.dole.gov.ph/UserFiles/oshc2010/file/OSH\\_Standards\\_Amended\\_1989\\_Latest.pdf](http://www.oshc.dole.gov.ph/UserFiles/oshc2010/file/OSH_Standards_Amended_1989_Latest.pdf). [Accessed on 09 May 2014]

- 
- <sup>33</sup> Vipon Kititasnasorchai & Panat Tasneeyanond, Thai Environment Law, *Singapore Journal of International & Comparative Law*, (2000) 4 pp 1 – 35, [ONLINE]. Available at: <http://law.nus.edu.sg/sybil/downloads/articles/SJICL-2000-1/SJICL-2000-1.pdf>. [Accessed on 09 May 2014]
- <sup>34</sup> Ministry of Natural Resources and Environment, Pollution Control Department (2010) Presentation: Hazardous Substances Management. Bangkok, Thailand. 24 December. Available at: [http://infofile.pcd.go.th/mgt/AIT14Dec10\\_Hazardous.pdf?CFID=20758647&CFTOKEN=28790944](http://infofile.pcd.go.th/mgt/AIT14Dec10_Hazardous.pdf?CFID=20758647&CFTOKEN=28790944). [Accessed on 09 May 2014]
- <sup>35</sup> Land Transportation of Hazardous Substance B.E. 2546, Notification of Ministry of Industry under Hazardous Substances Act, Thailand (2003). Available at: [http://www.jetro.go.jp/thailand/e\\_activity/pdf/hmoinoti5.pdf](http://www.jetro.go.jp/thailand/e_activity/pdf/hmoinoti5.pdf). [Accessed on 09 May 2014]
- <sup>36</sup> Chemical Law (06/2007/QH12), Vietnam (2007). Available at: <http://www.vinachemia.gov.vn/index.php/en/legal-documents/35-vn-bn-phap-lut/318-luat-hoa-chat>. [Accessed on 09 May 2014]
- <sup>37</sup> International Labour Organisation (n.d.) Natlex database. [ONLINE] Available at: [http://ilo.org/dyn/natlex/natlex\\_browse.details?p\\_lang=en&p\\_country=VNM&p\\_classification=01.02&p\\_origin=COUNTRY&p\\_sortby=SORTBY\\_COUNTRY](http://ilo.org/dyn/natlex/natlex_browse.details?p_lang=en&p_country=VNM&p_classification=01.02&p_origin=COUNTRY&p_sortby=SORTBY_COUNTRY). [Accessed on 12 May 2014]
- <sup>38</sup> Hanoi Lawyers Association, Dragon Law Firm (2011) Decree No. 104/2009/ND-CP dated November 09, 2010 of the Government providing for the list of dangerous goods and the transport of dangerous goods by road motor vehicles. [ONLINE]. Available at: <http://lawfirm.vn/?a=doc&id=1607>. [Accessed on 12 May 2014]
- <sup>39</sup> Chemical Inspection and Regulation Service (2013) GHS in Vietnam. September. [ONLINE]. Available at: [http://www.cirs-reach.com/GHS/Vietnam\\_GHS\\_SDS\\_Labelling.html](http://www.cirs-reach.com/GHS/Vietnam_GHS_SDS_Labelling.html). [Accessed on 12 May 2014]
- <sup>40</sup> Department of Occupational Safety and Health, Malaysia (n.d.) Occupational Safety And Health (Classification, Labelling And Safety Data Sheet Of Hazardous Chemicals) Regulations 2013 [P.U.(A)310/2013]. [ONLINE]. Available at: [http://www.dosh.gov.my/index.php?option=com\\_content&view=article&id=994:peraturan-peraturan-keselamatan-dan-kesihatan-pekerjaan-pengelasan-pelabelan-dan-helaian-data-keselamatan-bahan-kimia-berbahaya-2013-p-u-a-310-2013&catid=485:main-slide-banner-seasonal&Itemid=1191&lang=en](http://www.dosh.gov.my/index.php?option=com_content&view=article&id=994:peraturan-peraturan-keselamatan-dan-kesihatan-pekerjaan-pengelasan-pelabelan-dan-helaian-data-keselamatan-bahan-kimia-berbahaya-2013-p-u-a-310-2013&catid=485:main-slide-banner-seasonal&Itemid=1191&lang=en). [Accessed on 12 May 2014]
- <sup>41</sup> UNITAR (2013) GHS Review Conference for Southeast Asia, Session 3: Status of GHS implementation in Southeast Asia: Myanmar Presentation Slides. [ONLINE]. Available at: <http://www.unitar.org/cwm/node/222>. [Accessed on 12 May 2014]
- <sup>42</sup> Association of Southeast Asian Nations (n.d.) Entities Associated with ASEAN. [ONLINE]. Available at: <http://www.asean.org/asean/entities-associated-with-asean>. [Accessed on 12 May 2014]
- <sup>43</sup> Asia-Pacific Economic Cooperation (n.d.) Chemical Dialogue. [ONLINE]. Available at: <http://www.apec.org/Groups/Committee-on-Trade-and-Investment/Chemical-Dialogue>. [Accessed on 12 May 2014]
- <sup>44</sup> Ministry of Economy, Trade and Industry (METI), Japan (2006) Japan's GHS Capacity Building Activities in Asia. [ONLINE]. Available at: [http://www2.unitar.org/cwm/publications/cbl/ghs/Documents\\_2ed/D\\_National\\_Documents\\_and\\_Legislation/254\\_Japan\\_ghs-asia.pdf](http://www2.unitar.org/cwm/publications/cbl/ghs/Documents_2ed/D_National_Documents_and_Legislation/254_Japan_ghs-asia.pdf). [Accessed on 13 May 2014]
- <sup>45</sup> Economic Research Institute for ASEAN and East Asia (2012) Research Project Reports. [ONLINE]. Available at: [http://www.eria.org/publications/research\\_project\\_reports/study-on-the-feasibility-of-and-information-infrastructure-for-the-future-chemicals-management-schem.html](http://www.eria.org/publications/research_project_reports/study-on-the-feasibility-of-and-information-infrastructure-for-the-future-chemicals-management-schem.html). [Accessed on 13 May 2014]
- <sup>46</sup> Chemical industries Council of Malaysia (n.d.) About CICM. [ONLINE]. Available at: <http://www.cicm.org.my/2014-04-03-17-06-17/cicmintroduction>. [Accessed on 13 May 2014]
- <sup>47</sup> Soe P. P. (2013) GHS Review Conference for Southeast Asia, Presentation: Status of GHS Implementation in Myanmar. 21-23 May. Available at: <http://ghschina.miit.gov.cn/n11293472/n11293877/n14505342/n14506911/n14506987/n15432499.files/n15432496.pdf>. [Accessed on 13 May 2014]
- <sup>48</sup> SPIK Chemical Industry Association of the Philippines (n.d.) The Philippine Chemical Industry. [ONLINE]. Available at: <http://spikchemicals.wordpress.com/the-chemical-industry/>. [Accessed on 13 May 2014]

- 
- <sup>49</sup>International Council of Chemical Associations (n.d.) Responsible Care Members. [ONLINE]. Available at: <http://www.icca-chem.org/en/Home/Responsible-care/Responsible-Care-Members/?country=th>. [Accessed on 13 May 2014]
- <sup>50</sup>Chemical Society of Vietnam. [ONLINE]. Available at: <http://csv.net.vn/>. [Accessed on 13 May 2014]
- <sup>51</sup>RECPnet Global Network (n.d.) Resource Efficient and Cleaner Production: From NCPCs to RECPnet. [ONLINE]. <http://recpnet.org/pdf/RECPnet.pdf>. [Accessed on 10 June 2014]
- <sup>52</sup>UNEP-Sustainable Consumption and Production. n.d. The National Cleaner Production Centres: building and supporting local capacity. [ONLINE]. <http://www.unep.fr/scp/cp/network/pdf/NCPCsNote.pdf>. [Accessed on 10 June 2014]
- <sup>53</sup>UNISDR. [ONLINE]. Available at: <http://www.unisdr.org/>. [Accessed on 19 May 2014]
- <sup>54</sup>UNISDR (n.d.) Regional Organizations & Platforms. [ONLINE]. Available at: <http://www.unisdr.org/partners/regional>. [Accessed on 19 May 2014]
- <sup>55</sup>6<sup>th</sup> Asia Ministerial Conference on Disaster Risk Reduction. [ONLINE]. Available at: <http://6thamcdrr-thailand.net/6thamcdrr>. [Accessed on 19 May 2014]
- <sup>56</sup>AHA Centre [ONLINE]. Available at: <http://www.ahacentre.org/>. [Accessed on 19 May 2014]
- <sup>57</sup>SAARC Disaster Management Centre. [ONLINE]. Available at: <http://saarc-sdmc.nic.in/index.asp>. [Accessed on 19 May 2014]
- <sup>58</sup>Law of the Republic of Indonesia concerning Disaster Management, No.24 of 2007 (2007). [ONLINE]. Available at: <http://www.preventionweb.net/english/policies/v.php?id=10841&cid=80>. [Accessed on 19 May 2014]
- <sup>59</sup>Department of Occupational Safety and Health, Malaysia (n.d.) Regulations Under Occupational Safety And Health Act 1994 (Act 514). [ONLINE]. Available at: [http://www.dosh.gov.my/index.php?option=com\\_docman&task=cat\\_view&gid=169&Itemid=181&lang=en](http://www.dosh.gov.my/index.php?option=com_docman&task=cat_view&gid=169&Itemid=181&lang=en). [Accessed on 20 May 2014]
- <sup>60</sup>Slideshare (2012) Emergency response planning and implementation. 08 April. [ONLINE]. Available at: <http://www.slideshare.net/NikRonaidi/emergency-response-planning-and-implementation>. [Accessed on 20 May 2014]
- <sup>61</sup>DRR Knowledge Center, The online library for the Philippine Disaster Risk Reduction and Management (n.d) Philippine Laws Related to Disaster Risk Reduction. [ONLINE]. Available at: <http://drrknowledge.net/phil-laws-drr/>. [Accessed on 20 May 2014]
- <sup>62</sup>Avatchanakorn P. (2009) Presentation: The Chemical Incidents Response in Thailand, Department of Disaster Prevention and Mitigation of Thailand. Singapore. 22-23 October. Available at: [http://www.disaster.go.th/dpm/index.php?option=com\\_docman&task=doc\\_download&gid=517&Itemid=315](http://www.disaster.go.th/dpm/index.php?option=com_docman&task=doc_download&gid=517&Itemid=315). [Accessed on 20 May 2014]
- <sup>63</sup>The Republic of the Union of Myanmar – President’s Office (2013) Myanmar to step up efforts for disaster reduction, Preparedness. Nay Pyi Taw. 14 October. [ONLINE]. Available at: <http://www.president-office.gov.mm/en/?q=briefing-room/news/2013/10/14/id-2813>. [Accessed on 20 May 2014]
- <sup>64</sup>Asian Disaster Risk Centre (n.d.) Information on Disaster Risk Reduction of the Member Countries - Cambodia. [ONLINE]. Available at: <http://www.adrc.asia/nationinformation.php?NationCode=116&Lang=en&Mode=country>. [Accessed on 20 May 2014]
- <sup>65</sup>Law on Natural Disaster Prevention and Control (No.33/2013/QH13). (2013) Available at: [http://www.ifrc.org/Global/Publications/IDRL/Law%20on%20Natural%20Disaster%20Prevention%20and%20Control\\_No%20%202033\\_IFW.pdf](http://www.ifrc.org/Global/Publications/IDRL/Law%20on%20Natural%20Disaster%20Prevention%20and%20Control_No%20%202033_IFW.pdf). [Accessed on 21 May 2014]
- <sup>66</sup>UNISDR (n.d.) Terminology. [ONLINE]. Available at: <http://www.unisdr.org/we/inform/terminology#letter-t>. [Accessed on 21 May 2014]
- <sup>67</sup>E. G. Petrova and E. Krausmann (2011) *From natural hazards to technological disasters*, Natural Hazards and Earth System Sciences, 11, 3063–3065
- <sup>68</sup>6<sup>th</sup> Asian Ministerial Conference (2014) Key Documents: Concept note of the conference. Available at: <http://6thamcdrr-thailand.net/6thamcdrr/Key-Documents>. [Accessed on 21 May 2014]